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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/517,495	12/10/2004	Sohan Sarin	69993-254192	7090
26694	7590	11/10/2009		
VENABLE LLP				
P.O. BOX 34385				
WASHINGTON, DC 20043-9998				
EXAMINER				
PHILLIPS, FORREST M				
ART UNIT		PAPER NUMBER		
2832				
MAIL DATE		DELIVERY MODE		
11/10/2009		PAPER		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/517,495

**Applicant(s)**

SARIN ET AL.

**Examiner**

FORREST M. PHILLIPS

**Art Unit**

2832

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 25 June 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1,5-6,8-12, and 17-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218), Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al).

With respect to claim 1 Carr discloses an acoustic liner (see figure 6) arranged to attenuate sound, comprising a top sheet (96 in figure 6) having substantially linear characteristics and liner core or cavity (90 in figure 6) wherein the top sheet is metallic (Column 6 lines 50-65).

Carr does not disclose wherein the top layer is a metallic foam or specifically address the linearity of the top sheet.

Bristow discloses the use of porous metallic foam as a sound absorber in a high temperature region (see figures and paragraphs 23, and 24).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Bristow to use a metallic foam with the core of Carr in order to provide a greater degree of high frequency sound attenuation.

Kishimoto discloses the use of foamed Nickel alloy as an energy damping material and discloses that it has a linear elastic property with regard to vibration damping (see abstract).

Liu discloses that foamed metals, specifically aluminum have a linear property and a nonlinear property in their damping and this that nonlinearity is a property of the foaming process, porosity and pore size.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Carr and Bristow to use metallic foams as sound absorbers and the teachings of Kishimoto and Liu to determine the specific foam to use to gain linear characteristics.

With respect to claim 5 Carr further discloses wherein a first surface of said metallic foam layer is attached to one side of said liner core (refer to figure 6).

With respect to claim 6 Carr further discloses wherein the liner core (90 in figure 6) is a honeycomb core.

With respect to claim 8 Carr further discloses wherein said top sheet further comprises a perforate sheet (94 in figure 6) attached to the metallic foam layer.

With respect to claims 9 and 10 while not expressly disclosing the temperatures as claimed, it would have been understood by one of ordinary skill in the art the temperature of the gas stream in Bristow would have been high, and it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working range involves only routine skill in the art. In re Aller, 105 USPQ 233.

With respect to claim 11 Kishimoto further discloses wherein the metallic foam layer comprises a metal or metal alloy including Nickel, titanium and/or chromium.

With respect to claim 12 Bristow further discloses further discloses wherein the metallic foam is at least partly open-porous (paragraph 23 and given the function of the foam, it would necessarily be open-porous as the gas passes through the material).

With respect to claim 17 Carr further discloses wherein the top sheet is designed for attenuating various acoustic environments such as different flight conditions for aircraft engines ( Column 6 lines 50-65).

With respect to claims 18 and 19 Carr as modified by Bristow and Wilson discloses a liner for attenuating sounds and is composed of materials able to withstand high heat environments, it would have been obvious to one of ordinary skill in the art to place the linear in hot stream environment or a hot area of an aircraft engine.

It has been held that a recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F.2d 1647 (1987).

2. Claims 2-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218) Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al) as applied to claim1 above, and further in view of Arcas et al. (US5175401).

Arcas is relied on solely to teach the importance of the nonlinearity factor (Column 2 lines 13-17).

Carr as modified does not disclose a specific non-linearity factor.

In view of the teachings of Arcas as to the importance of the nonlinearity factor it would have been obvious to one of ordinary skill in the art to select any desired nonlinearity factor according to the conditions of use, since it has been held that wherein the general conditions of a claim are disclosed in the prior art, discovering the optimum or working range involves only routine skill in the art. In re Aller, 105 USPQ 233.

3.Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218) Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al) as applied to claim 1 above, and further in view of Kraft (US6182787).

With respect to claim 7 Carr as modified discloses the invention as claimed except wherein the liner core is of metallic foam.

Kraft discloses that it is well known in the art to substitute a bulk material for a resonator structure in an acoustic liner (Column 1 lines 35-50).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Kraft to have a bulk material in place of the

honeycomb structure of Carr and to use the metallic foam for simplicity of construction and heat resistance.

4. Claims 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218), Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al) and Ely (US4291080).

With respect to claim 20 Carr as modified discloses the structure as the claimed invention but fails to disclose the use of brazing.

Ely discloses the use of brazing to attach a metallic foam cover (12 to a honeycomb core (column 2 line 55).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Ely to braze components with the structure taught by Carr as modified to provide a means of securing the components not requiring adhesives.

Brazing is taught by Ely as a method of combining components.

5. Claims 13-16 and 22-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218), Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al), and Ely (US4291080) as applied to claim 20 above, and further in view of Tschudin-Mahrer (US4867271).

With respect to claim 13 Carr as modified discloses the invention as claimed except wherein the top sheet is compressed.

Tschudin-Mahrer discloses the use of a compressed foamed material as an acoustic insulation, the acoustical characteristics being changed due to compression (see abstract and column 1 lines 10-15).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Tschudin-Mahrer to compress the top sheet with the liner of Carr as modified to provide a means of tuning the liner by altering the absorptive properties.

With respect to claim 14 Tschudin-Mahrer further discloses wherein the foamed layer is compressed to a different degree in different areas of the sheet (I and II in figure 2).

With respect to claim 16 Tschudin-Mahrer further discloses wherein the degree of compression is continuously changed over the top sheet (see figure 2,

With respect to claim 22 Carr as modified discloses the invention as claimed except for wherein the top sheet is formed through applying pressure to selected areas of the top sheet surface.

Tschudin-Mahrer discloses wherein a foamed layer is formed by applying pressure to selected areas (see figure 2).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Tschudin-Mahrer to have indentations compressed into a foam layer with the method of Carr as modified.



With respect to claim 23 Tschudin-Mahrer discloses wherein the pressure is applied to a different degree in different areas (refer to figure2).

With respect to claim 25 Tschudin-Mahrer further discloses wherein the pressure applied over the different areas is increased/decreased in a continuous manner (unnumbered triangular indentations in figure 15).

6. Claims 15, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218), Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al), and Ely (US4291080), Tschudin-Mahrer (US4867271) as applied to claims 14 and 23 above, and further in view of Kempton (US20060011408).

With respect to claims 15 and 24 Carr as modified discloses the invention as claimed except wherein the degree of compression is stepwise increased/decreased over the top sheet.

Kempton discloses an acoustic liner wherein the thickness of the absorbing material is increased/decreased in stepwise manner (see figure 3).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Kempton with Carr as modified to include a stepwise increase or decrease to provide an impedance discontinuity and provide acoustic scattering (abstract).

7. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carr(US4817756) in view of Bristow (US20050067218), Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al) Arcas (US5175401) Ely (US4291080) Tschudin-Mahrer (US4867271) .

With respect to claims 26-27 Carr discloses an acoustic liner comprising a liner core (90 in figure 6), and a top sheet (96 in figure 6).

Bristow discloses the use of porous metallic foam as a sound absorber in a heat temperature region, and the compression of the foam to alter the flow characteristics (see figures and paragraphs 23, and 24).

Arcas is relied on solely to teach the importance of the nonlinearity factor (Column 2 lines 13-17).

Carr as modified does not disclose an specific non-linearity factor. In view of the teachings of Arcas as to the importance of the nonlinearity factor it would have been obvious to one of ordinary skill in the art to select any desired nonlinearity factor according to the conditions of use, since it has been held that wherein the general conditions of a claim are discloses in the prior art, discovering the optimum or working range involves only routine skill in the art. In re Aller, 105 USPQ 233.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of, Arcas, Ely, Bristow Kishimoto ,Liu and Tschudin-

Mahrer (US4867271) with the liner of Carr to provide an improvement in sound reduction.

With respect to claim 29 Tschudin-Mahrer further discloses wherein the pressure applied over the different areas is increased/decreased in a continuous manner (see figure 2).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over Carr (US4817756) in view of Bristow (US20050067218), Kishimoto et al. (Mechanical Property of Metallic Closed Cellular Materials Containing Organic Material for Passive Damping and Energy-Absorbing Systems) and Liu et al. (Study on nonlinear damping properties of foamed Al) Arcas (US5175401) Ely (US4291080) and Tschudin-Mahrer (US4867271) as applied to claim 26 above, and further in view of Kempton (US20060011408).

With respect to claim 28 Kempton discloses an acoustic liner wherein the thickness of the absorbing material is increased/decreased in stepwise manner (see figure 3).

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine the teachings of Kempton with Carr as modified to include a stepwise increase or decrease to provide an impedance discontinuity and provide acoustic scattering (abstract).

### ***Response to Arguments***

Applicant's arguments with respect to claims 1-29 have been considered but are moot in view of the new ground(s) of rejection.

Regarding applicant's arguments that Bristow does not disclose a linear top sheet, Applicant points out that Bristow teaches that porosity etc. affects the linear characteristic. When taken in combination, Carr as modified discloses a means for providing linear characteristics in a sound absorbing foam.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FORREST M. PHILLIPS whose telephone number is (571)272-9020. The examiner can normally be reached on Monday through Friday 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Elvin Enad can be reached on 57127221990. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/F. M. P./  
Examiner, Art Unit 2832

/Jeffrey Donels/  
Primary Examiner, Art Unit 2832